

HPLC Troubleshooting Mini Guide

Leaking Issues



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Overview



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Locating and Correcting the Problem

A systematic approach to identifying the problem is the best path to troubleshooting your HPLC system. This guide is organized by four major categories of symptoms to help you quickly identify the source of the problem(s) you are encountering:

- pressure abnormalities
- leaks
- peak problems
- baseline issues



When you have corrected the problem, record the incident in the system recordbook to help with future problems.

Prevention

Many LC problems can be prevented with routine preventive maintenance such as replacing pump seals regularly. Consistent preventive maintenance practices will enhance lab productivity, avoid system critical damage, equipment downtime and costly repairs.

Where to Get Additional Help

1. Chat with Phenomenex technical experts. Phenomenex has experienced technical consultants who can assist you with any chromatography issue in real time. To chat now go to www.phenomenex.com/chat.
2. The operator's and service manuals for the instrument should be consulted. These contain exploded diagrams, troubleshooting procedures for specific models, and part numbers to help you order replacement parts.
3. Other people in the lab may have had experience solving a problem which is giving you trouble; they can be a helpful resource.
4. The manufacturer of your instrument can help you. Most LC manufacturers offer free technical support to their customers.
5. Phenomenex offers seminars on HPLC/UHPLC. Join PhenoAcademy for specialty troubleshooting webinars, www.phenomenex.com/phenoacademy
6. Other resources:
 - J.W. Dolan and L.R. Snyder, **Troubleshooting LC Systems**, Humana Press, NJ (1989).
 - L.R. Snyder and J.J. Kirkland, **Introduction to Modern Liquid Chromatography**, 2nd ed., Wiley, NY (1979).
 - D.J. Runser, **Maintaining and Troubleshooting HPLC Systems - A User's Guide**, Wiley, NY (1981).
 - J.W. Dolan, "LC Troubleshooting", LC/GC Magazine. This is a monthly column.

Leaking Issues

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Leaks are usually stopped by tightening or replacing a fitting. Be aware, however, that overtightened metal compression fittings can leak and plastic fingertights can wear out. If a fitting leak does not stop when the fitting is tightened a little, take the plastic fingertight fittings apart and inspect for damage (e.g. distorted ferrule, or particles on the sealing surface); damaged fittings should be discarded.

Leaky fittings

POSSIBLE CAUSE	SOLUTION
1. Loose fitting	1. Tighten
2. Stripped fitting	2. Replace
3. Overtightened* fitting	3. a. Loosen and retighten b. Replace
4. Dirty fitting	4. a. Disassemble and clean b. Replace
5. Mismatched parts	5. Use all parts from same brand

Leaks at pump

POSSIBLE CAUSE	SOLUTION
1. Loose check valves	1. a. Tighten check valve (do not overtighten) b. Replace check valve
2. Loose fittings*	2. Fingertight fittings (do not overtighten)
3. Mixer seal failure	3. a. Replace mixer seal b. Replace mixer
4. Pump seal failure	4. Repair or replace
5. Pressure transducer failure	5. Repair or replace
6. Pulse damper failure	6. Replace pulse damper
7. Proportioning valve failure	7. a. Check diaphragms, replace if leaky b. Check for fitting damage, replace
8. Purge valve	8. a. Tighten valve b. Replace purge valve

*Note: Use fingertight fittings to avoid sealing problems and the need for wrenches

Leaking Issues (continued)

Injector leaks

POSSIBLE CAUSE	SOLUTION
1. Rotor seal failure	1. Rebuild or replace injector
2. Blocked loop	2. Replace loop
3. Loose injection-port seal	3. Adjust
4. Improper syringe-needle diameter	4. Use correct syringe
5. Waste-line siphoning	5. Keep waste line above surface waste
6. Waste-line blockage	6. Replace waste line

Column leaks

POSSIBLE CAUSE	SOLUTION
1. Loose endfitting	1. Tighten endfitting
2. Column packing in ferrule	2. Disassemble, rinse ferrule, reassemble
2. Tubing stem length longer than column port depth	2. Check column port depth; adjust or replace connecting fitting

Detector leaks

POSSIBLE CAUSE	SOLUTION
1. Cell gasket failure	1. a. Prevent excessive backpressure b. Replace gasket
2. Cracked cell window(s)	2. Replace window(s)
3. Leaky fittings	3. Tighten or replace
4. Blocked waste line	4. Replace waste line
5. Blocked flow cell	5. Clean or replace

Key Problem Areas and Preventive Maintenance



The chart below lists the most common problems that occur with each LC module. In the right-hand column are listed preventive maintenance practices that can reduce the failure rate. The numbers in parentheses are suggested intervals between maintenance. The operator's and service manuals for your LC may have additional suggestions for preventive maintenance of your model of LC.

Reservoir

POSSIBLE CAUSE	SOLUTION
1. Blocked inlet frit	1. a. Replace (3-6 mo.) b. Filter mobile phase, 0.5µm filter
2. Gas bubbles	2. Degas mobile phase

Pump

POSSIBLE CAUSE	SOLUTION
1. Air bubbles	1. Degas mobile phase
2. Pump seal failure	2. Replace (3 mo.)
3. Check valve failure	3. Filter mobile phase, use inlet-line frit. Keep spare.

Injector

POSSIBLE CAUSE	SOLUTION
1. Rotor seal wear	1. a. Don't overtighten b. Filter samples

Column

POSSIBLE CAUSE	SOLUTION
1. Blocked frit	1. a. Filter mobile phase b. Filter samples c. Use in-line filter and/or guard column
2. Void at head of column	2. a. Avoid mobile phase pH at or near column max pH limit b. Install column at low flow rates to avoid pressure shock c. Use guard column

Protect Your HPLC Column

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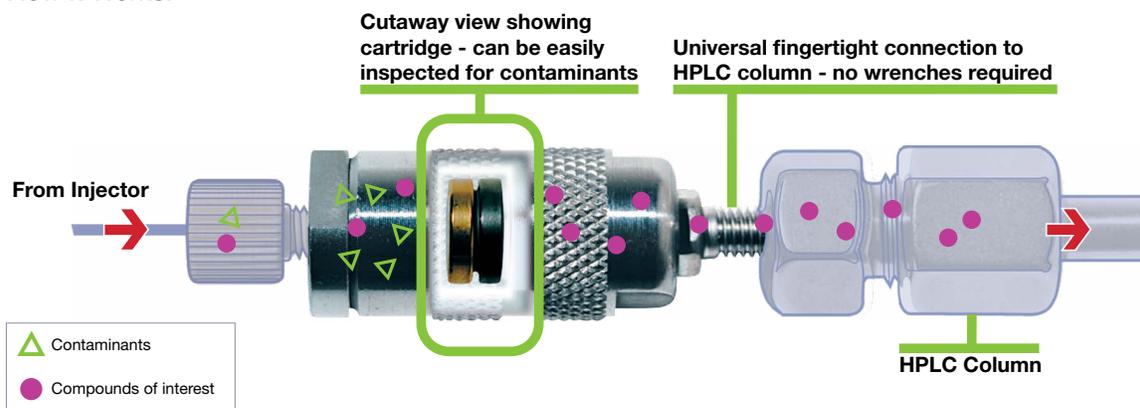
Contaminants Can Cause the Following:

- High Backpressure
- Split Peaks
- Broad Peaks
- Baseline Noise
- Baseline Drift
- Loss of Resolution
- Irreversible Column Damage
- System Damage

Protect Your HPLC Column. Protect Your Results.

The SecurityGuard™ and SecurityGuard ULTRA cartridge systems effectively protect analytical columns from the damaging effect of contaminants that could impact results and data quality. Either cartridge system is designed to trap contaminants without altering your chromatography.

How It Works:



SecurityGuard and SecurityGuard ULTRA standard can adjust to fit any manufacturer's female/inverted endfitting.



Additional information can be found at www.phenomenex.com/securityguard

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- More consistent, reproducible results
- Increased column lifetime

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- Broad chemical compatibility
- Minimized extractables
- Excellent flow rate
- High total throughput
- Low hold-up volume
- Certified quality
- 100 % integrity tested



MEMBRANE TYPES

RC (Regenerated Cellulose)

PTFE, Teflon® (Polytetrafluoroethylene)

PES (Polyethersulfone)

PVDF (Polyvinylidene Fluoride)

NY (Nylon)

CA (Cellulose Acetate)

GF (Glass Fiber)



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